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CHARLES VALUE CHAPIN ANNUAL ORATION*

ATHEROSCLEROSIS — ITS CAUSES

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I am greatly honored in being asked to deliver the Charles Value Chapin Oration before this society. It is not my intent to discuss in detail the life of service to humanity which made Dr. Chapin an outstanding personality. The qualities that made him an international authority on epidemiology, the erudition and personality that made him a great teacher, the practical common sense that led to the debunking of casual health procedures, particularly disinfection, the intensity of interest and the rugged honesty of purpose that gave him leadership in health matters were public manifestations of his genius, and, therefore, matters of common knowledge.

The problems which he had to face as a health official were of necessity those of the *public* health which was endangered particularly by the communicable diseases. He officiated during the period when control of these diseases was being established. We have to thank him and his colleagues that the expectation of life at birth has been increased from 40 years in 1850 to 63 years today. This increase in life expectation has been accomplished largely through control of the infectious diseases of early life; infancy, childhood and the early adult period. With the use of sulfa drugs pneumonia and streptococcus infections, which resisted public health measures, are becoming less serious in their effects. Gramicidin and penicillin have opened pathways which should lead to a wider control of surgical infections. In other words the menace of infectious diseases is much less alarming with every year of progress in knowledge.

We may now give attention to the group of diseases which are becoming a serious threat to our civilization. We are a progressively aging population. While it is true that we have greatly increased the expectation of life at birth, we have not measurably increased the expectation of life from age 40. There are more persons living beyond age 50 and age 60 than in previous generations. Moreover, depression and birth control are credited with a lowering of the school population in New York City alone, of 150,000 in six years. The problems of our aging population have to do largely with chronic noninfectious diseases, notably diseases of the cardiovascular system. These diseases with cancer make up the *private* health problem of today. There is little hope of cure in connection with the cardiovascular diseases in general. The greatest promise lies in methods of prevention. Prevention to be successful requires a knowledge of the cause of a disease. It is my purpose to present to you evidence of the cause of the most important of these diseases, i.e. atherosclerosis.

The discovery of the vitamins and disclosure of their specific efficiency has led us in the recent period to recognition of the fact that diet may play an important part in determining the health of the people. Lack of vitamins leads to the production of what are properly called deficiency diseases. On the other hand we have in diabetes and obesity examples of diseases associated with excess of dietary factors, carbohydrates or fats. It is with the diseases of excess that our subject is associated.

I am going to take for my text for this discourse some sentences from a lecture on "The Value of

**This year the Rhode Island Medical Society established the Annual Charles Value Chapin Oration. Dr. Leary was asked to give this first oration and he prefaced his paper by the following introductory remarks.*

Human Life", delivered before the American Public Health Association in 1912 by Dr. Chapin. "Let us not deal too long in glittering generalities. It is our duty as hygienists and health officers to be specific. We must measure more accurately the causes of disease; we must show more clearly the methods of prevention." The work whose findings I shall demonstrate to you is an attempt to clear away the glittering generalities that have surrounded the question of the cause of atherosclerosis. To some the disease was the result of the wear and tear of life. To others it was the will of God that men should die in the third and fourth decades of coronary sclerosis. Deaths from the wear and tear of life alone are quite rare. Wear and tear processes may and do play a part in favoring the localization and in accelerating the progress of atherosclerosis, but the basic element in the causation of the disease is not wear and tear.

In accord with one of the principles which the life work of Dr. Chapin made manifest, i.e., that proof is of much greater scientific value than discourse, I am presenting the subject of this evening's oration in the form of a lantern slide demonstration. This makes it possible to actually follow the progressive stages in the study of the genesis of atherosclerosis from the lesions in man through a series of progressive experimental researches. These latter culminated in the discovery of the complex mechanism by which ingested cholesterol is esterfied, accumulates in excess and is carried to the arterial intima to give rise to the lesions of atherosclerosis. Furthermore, these studies disclosed that excess cholesterol is an irritant, comparable to a degree with silica. The application of these data to the problems of the most important lesions of human atherosclerosis, those of the coronary arteries, and their differences in youth, in the middle period and in old age serve to complete the picture. The following is an abstract of the demonstration:

The important form of arteriosclerosis is atherosclerosis, distinguished from other forms by the presence of fatty material (cholesterol esters) in the lesions. Aschoff's theory of causation is that wear and tear from blood pressure injures the deep layers of the arterial intima. The intima depends for nutrition on the diffusion of plasma from the blood circulating in the artery. Injury to the deep layers is followed by degeneration and the precipitation of free cholesterol esters from the plasma. The free ester droplets are picked up by phagocytic cells which become lipoid (foam) cells. Klotz objected that in early lesions there were no free cholesterol esters and no degeneration. The foam cells appear first in the subendothelial layer and not in the deep layers. He believed that the Aschoff theory was based on the study of advanced lesions in which free esters arose from the breaking down of foam cells. My studies support Klotz's observations.

The Russian school produced atherosclerosis-like lesions in rabbits by feeding animal fats. Then Anitschkow and Chalatow produced these lesions by feeding cholesterol. This work was not accepted. The experimental disease was called, disparagingly, "the cholesterol disease of rabbits".

Cholesterol, present in combined form in all animal cells, occurs in visible form (polariscope) in the adrenal cortex and in myelin sheaths. Apart from these tissues visible cholesterol is associated with disease conditions. It is literally *excess* cholesterol. Experimental evidence indicates that *excess cholesterol* is a *chronic irritant*, stimulating growth of connective tissue.[1]

The early lesions of atherosclerosis are made up of foam cells. In *atheroma*, the reversible process in youth, the excess cholesterol is removed from the arteries by fibroblastic cells, and the lesions disappear. In progressive processes, i.e. *atherosclerosis*, the cholesterol accumulates, provokes fibrosis, and the lesions enlarge into typical atherosclerotic nodules[2].

In rabbits fed cholesterol there is a latent period of weeks following the beginning of feeding before lesions appear in the aorta. By killing animals at critical intervals during this period I have been able to show that the ingested cholesterol is brought to the liver and esterified; that the esters collect in excess in the liver and adrenals; that Kupffer cells in the liver and similar cells in the adrenals engulf the excess esters as particulate matter; that these ameboid cells, now become foam cells, escape from the organs through the blood and lymph streams, pass the so-called filter of the lungs, and invade the aortic intima.[1] In this way atherosclerosis is produced. The disease, whether human or experimental, cannot occur without excess cholesterol.

Cholesterol is synthesized in the human body. The excess is probably ingested, egg yolk, milk and animal fats being the sources. Needs for cholesterol are greatest in times of rapid cell formation. Egg yolk is intended for the embryo, milk for the nursling. Metabolism of cholesterol is most efficient in the young, though heredity is a factor. The tissue content of cholesterol increases with age, and the needs for it grow less. Females mobilize cholesterol during pregnancy (for the use of the embryo?) and show minor mobilization with menstruation. They are less susceptible to atherosclerosis than males.

Excess cholesterol is the cause of atherosclerosis. Stresses determine the localization of lesions. Sex and thyroid secretion influence cholesterol metabolism. Age (time plus thyroid deterioration), and heredity are modifying factors. Diets with limited or absent cholesterol should prevent atherosclerosis. Vegetable oils, whose sterols are not absorbed, can be substituted for animal fats.

Coronary Sclerosis

Coronary sclerosis is almost exclusively atherosclerosis. The frequency of coronary disease is related to the unusual stresses to which the vessels are subjected. They arise directly from the aorta in a region of maximal stress as the aortic cusps close. Moreover, circulation is shut off from their muscular branches by compression as the ventricles contract in systole. At the same time the main vessels and their subepicardial branches are not compressed, but are filled with blood under systolic pressure, without being able to empty themselves. The main coronary circulation is during diastole. Because of stresses normal coronary arteries develop characteristic thickening of the intima to produce a "buffer" layer.

Advanced coronary sclerosis in my series at 12 and 18 years of age, with coronary deaths at 24, 25, 26, 28, 29 years of age, and many in the thirties, determine that atherosclerosis is not a disease of old age.[3]

The type of lesions found varies with age. In *youth* excess cholesterol provokes a growth of loose textured fibroblastic tissue. As the lesions enlarge diffusion of nutritive material from the circulating blood (the normal supply to the intima) becomes inadequate, and necrosis of the deep layers results. If the lesions enlarge, vascularization by capillaries from the lumen, or less commonly from vasa vasorum, supplies the nutriment. (All advanced coronary lesions are vascularized.) The coronary lumen is narrowed by eccentric or concentric thickening of the intima. Spasm may result in rupture of capillaries, fibrin formation and fibrinoid necrosis. With extension of the necrosis to the endothelium *thrombosis* will follow, and is the usual cause of sudden death.

In *middle age* more collagen is formed and scarring is typical of this period. Narrowing of the coronary lumen (with coronary insufficiency), and chronic vascular myocarditis are frequently found at postmortem examination. *Spasm* may result in sudden death or in infarction without anatomic occlusion of vessels, particularly in hypertensive heart disease. Thrombosis is less common than in youth. Calcification becomes more common.

In *old age* atherocheumas occur frequently, because of lowered tissue reaction to excess cholesterol. Occlusion may be caused by rupture of an *atherocheuma*. Scarring persists from earlier periods, and calcification is almost usual.

Rupture through the necrotic tissues of a cardiac infarct may cause death by hemopericardium and cardiac tamponade. Rupture of an atherosclerotic coronary artery may lead to hemopericardium. Dissecting aneurysms of the coronary arteries are rare. Infarcts are repaired by granulation, sometimes with pericardial adhesions. Mural cardiac thrombi may lead to systemic embolism, e.g. cerebral. The scar tissue repairing an infarct may stretch producing a cardiac aneurysm. Coronary thrombi undergo organization, if the individual lives, sometimes with canalization. Usually the blood flow is reestablished about the region of thrombosis by a collateral circulation. Anastomoses between coronary arteries increase with age.

Coronary occlusion (1) may be symptomless—(2) may cause mild or serious illness—or (3) sudden death with ventricular fibrillation—or (4) death so instant as to suggest immediate cerebral arrest with cardiac and respiratory standstill.

1. The Genesis of Atherosclerosis, Archives of Pathology *32*: 507, 1941.

2. Atherosclerosis — Special Consideration of Aortic Lesions, Arch. Path. *21*: 419, 1936.

3. Experimental Atherosclerosis compared with Human (Coronary) Sclerosis, Arch. Path. *17*: 453, 1934.

PHENOL-CAMPHOR DERMATITIS

F. RONCHESE, M.D.

PROVIDENCE, R. I.

Several cases of dermatitis venenata from 50 per cent phenol-camphor mixture were observed recently. Here is one of them:

"A 45 year old white man, a solderer in a jewelry factory, was suffering from an erythemato-vesicular, pruriginous eruption of hands and feet, on and off for the last five years, the type which is very common and, unfortunately, very resistant to various forms of therapy. Apparently, he had good medical care, but only temporary relief.

While in despair, he happened to read the article printed in the May issue of the Reader's Digest, assuring relief once and for all to sufferers of "athlete's foot", by applying a 50 per cent mixture of phenol and camphor. He ran to a drug store, had the mixture prepared, and applied it to his hands and forearms.

The result can be seen in Fig. 1. A mass of blisters on forearms and hands with severe itching and pain.

A good etiological name for the original lesion in such a case still has to be found. The best, so far, is a symptomatic one, with reference to its stubbornness to various forms of therapy: viz., "recalcitrant vesicular eruption of hands and feet".

Obviously it cannot be called epidermophytosis unless a pathogenic fungus, viz., one of the recognized causes of epidermophytosis is found. Not any fungus which may be just a harmless occasional guest of the human skin.

Unfortunately, in speech and in medical writing the terms epidermophytosis, dermatomycosis et similia are widely and indiscriminately used without bothering to look under the microscope for one of the epidermophytons.

It may be called any name but epidermophytosis, when large blisters, well hidden under the thick skin of palms or soles, are lanced, and cultured fluid and flaps of skin are found sterile, under the best conditions of heat, moisture, darkness, falling arches, fatigue, lowered resistance from contact with caustics, etc.

Evidently, this man has not epidermophytosis. He is allergic to one, or a few, or to all the elements in contact with his hands or feet, but after much hearing on the radio or reading in newspaper advertisements, he believes he is suffering from epidermophytosis.

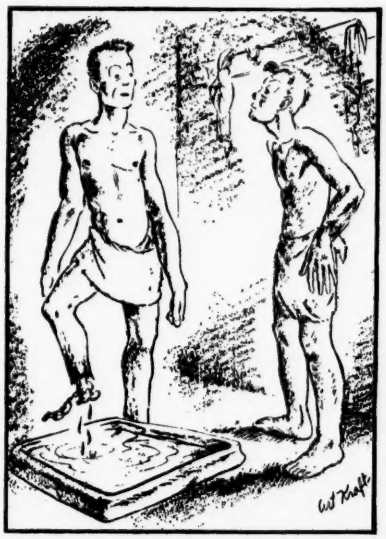
Further evidence of his polisensitivity was a severe adhesive plaster dermatitis on one of his legs after a few dressings for a small cut.

In a case like this, probably, 10 per cent ammoniated mercury ointment, or repeated applications of full strength tincture of iodine, or a combination of iodine and mercury, could have caused the same dermatitis. But imagine applying 50 per cent phenol on the raw, oozing surface of an allergic dermatitis. Like putting gasoline on fire.

The patient is certainly not to blame. It is the facility with which the lay press throws in the laps of suffering humanity news which is published for the physician to be digested and eventually prescribed under his responsibility.

Fig. 1, shows dermatitis venenata from application of 50 per cent mixture of phenol-camphor.

The matter is handled in Moliere's style by a popular magazine (fig. 2). Let's hope that this and the Federal Trade Commission be successful in ending quickly the disastrous use of this mixture.



Kraft-Yale Record

AN OUNCE OF PREVENTION

Sometimes the cure is worse than the itch.

Fig. 2, a cartoon from "The Yale Record" and caption from "Time" magazine of July 20, 1942, p. 51.

Summary

A case is reported of a severe dermatitis venenata from application of 50 per-cent phenol-camphor mixture on an allergic dermatosis.

122 Waterman Street.

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Francis, E., Phenol-Camphor for "Athlete's Foot", J.A.M.A., 117:1973 (Dec. 6), 1941.

Editorial, J.A.M.A., 119:182, (May 9) 1942.

"We suspect that the emphasis often placed upon the cancerigenic influence of the tobacco habit is to some extent influenced by the ubiquitous moralistic propaganda against the "filthy weed".

One often encounters similar Puritanic emphasis with regard to the role of alcohol in the causation of disease."

HAYES MARTIN

LEGAL MEDICINE CONFERENCE

On Wednesday, September 30, 1942, the Massachusetts Medico-Legal Society and the Department of Legal Medicine of Harvard Medical School will unite in an all day conference at the Mallory Institute of Pathology, Boston City Hospital. Here numerous subjects of medico-legal interest will be discussed and demonstrated. To this meeting medical examiners, coroners, physicians interested in these subjects, state or local legal officials or police authorities are cordially invited. Immediately following this session, the Department of Legal Medicine of Harvard has arranged for a more intensive post-graduate course to be held on October 1, 2, 3, 8, 9, and 10. This will include close study of many post-mortem investigations made from the medico-legal standpoint and the various procedures associated with possible crime detection, attendance limited to six. For the conference on September 30th preliminary registration only is required. For the post-graduate course a small fee will be made. Further information may be obtained from the Department of Legal Medicine, Harvard Medical School, 25 Shattuck Street, Boston, Massachusetts.

LOCAL BOY MAKES GOOD

Dr. Marshall N. Fulton, a former member of the Rhode Island Medical Society, who since that time has been on the Staff of the Harvard Medical School and Physician to the Peter Bent Brigham Hospital, has been commissioned as Major and ordered to the Walter Reed General Hospital in Washington. He has been assigned as Chief of the Cardio-vascular, Renal Section and Chief of the Electrocardiograph Department.

His friends and associates here will be pleased to hear of the important position to which he has been assigned. But there will be no element of surprise that the nephew of Dr. Frank Fulton, Dean of our Cardiologists, and the son-in-law of Dr. Halsey DeWolf, head of our Procurement and Assignment, is maintaining the pace of his families.

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106 Francis Street, Providence, R. I.

THE RHODE ISLAND HOSPITAL'S ARMY UNIT

To middle aged physicians, that is, those in the sixties, if one is also of that age, it seems a short while since the first Rhode Island Hospital Unit was organized and went across the submarine infested waters of the Atlantic to Ireland. But that was a quarter of a century ago, a long, long time to the internes signing up with the present one. Things were simple and straightforward in those days; it was a foregone conclusion that when they went abroad it would be to some spot within an easy hour's trip, as one can travel now, from the center of activities.

How different today:—as the lady in the New Yorker said, "Oh, dear, this war seems to be going everywhere that Herbert and I went on the Empress of Britain". It will be conveying no information to the enemy to say that they may soon be in Europe, Asia, Africa, Australia or Arctic North America. Recently a nurse helped us in the special room of Ward H. Another took her place and the patient has now shown us a newspaper with a photograph from way down under in Australia. It shows our fellow worker and other American nurses enjoying their second winter in one half year.

In the last war a comparatively limited group of the big hospitals of the country organized their own units of volunteer members and the Rhode Island Hospital early did this although there was a long wait after their formation before they were finally sent abroad. This time preliminary steps were taken long before America's entrance into the war and the personnel had been chosen and everything locally possible done far in advance.

Meanwhile the members have been carrying on their homework as nearly as possible as though they anticipated no interruption. But necessarily the situation has been disquieting. Long distance planning could not be done. And it may well be that to an extent a resigned feeling of relief may mingle with their regret at interrupting their chosen careers for the vicissitudes of army life. Some members are already in the Army, presumably to be transferred to the Unit when it takes the field. This is as may be. Governmental agencies exercise to the limit the proverbial feminine privilege of changing their minds. Let us hope the entire unit will be reunited.

Already the absence from practice and hospital clinics of those in the armed forces has been noticeable but when this large group of some of the most active of our doctors and nurses is taken from us en bloc we who are left behind are bound to experience a feeling of desolation.

But we wish them all God Speed and we are proud to print the names of the corporation members, nurses and doctors who are officially representing the Rhode Island Hospital with our army.

Four non-medical officers are needed in the organization and to make this completely a Rhode Island Hospital matter they have been selected from the Corporation.

ROSTER OF THE 48TH EVACUATION HOSPITAL

RHODE ISLAND HOSPITAL UNIT

Members of the Corporation:

Mr. Keith H. Goudey
Mr. Allen C. Hall
Mr. William W. White
Mr. Henry G. Lutz

Members of the Staff:

Dr. William A. Mahoney
Dr. Herman A. Lawson
Dr. J. Merrill Gibson
Dr. Eric Stone
Dr. J. Murray Beardsley
Dr. Arthur E. Martin
Dr. Edward G. Melvin
Dr. George F. Conde
Dr. John S. Dziob
Dr. Henry A. Campbell
Dr. Walter S. Jones
Dr. William W. Teahan
Dr. Samuel D. Clark
Dr. Vincent Zecchino
Dr. Edward Damarjian
Dr. Frederick A. Webster
Dr. William J. H. Fischer
Dr. Hubert Holdsworth
Dr. Thomas Perry
Dr. Wilbur Manter
Dr. Milton Korb
Dr. Frank B. Cutts
Dr. Robert G. Murphy
Dr. William L. Leet
Dr. D. Richard Baronian
Dr. John A. Dillon
Dr. Palmer Congdon
Dr. Francis A. Holland
Dr. Edward R. Squier
Dr. Irving Beck

Nurses—48th Evacuation Unit

Andrews, Rachel
Beaton, Maude P.
Cavanaugh, Dorothy L.
Carlson, Alice, 2nd Lt.
Chandler, Pauline C., 2nd Lt.
Cooper, Miriam L.
Couture, A. Bernadette
Duden, Florence G.
Dykstra, Matilda E., 1st Lt.
Easdon, Janet B.
Gillis, Marion L.
Harris, Dorothy M.
Hinchey, Mary C.
Hodnett, Catherine R.
Horvath, Jeanette, 2nd Lt.
Keaney, Mary A.
Kinsman, Florence R.
Kordek, Stephanie L.
Langille, Anna I.
Leach, Alice N.
Luby, Mae F.
Macomber, Dorothy M.
MacHenry, H. Eileen
MacIntosh, Annie E., 2nd Lt.
Major, Olive M.
Martin, Barbara M.
Mason, Thelma M., 2nd Lt.
McDonald, Mary E.
McManus, Alice C.
McMillan, Frances E.
Peirce, Mildred G.
Perkins, Zettie I.
Potter, Eleanor V.
Potter, Lina N.
Rendell, Edwina H.
Rollins, Mary L.
Rondeau, Yvonne
Sanders, Thelma P.
Sullivan, Anne E.
Tierney, Emma V.
Vallante, Flora M.
Wahlberg, Lillie E.
Weigold, Evelyn E.
Weinberger, Berte A.
Wentworth, Gwendolyn P.
Wojnar, Joyce L.

NOTE: All names which are followed by rank designate those nurses who are already in service.

OUR FIRST MEDICAL CASUALTY

DR. THOMAS A. MARTIN

Dr. Thomas A. Martin of Providence, a captain in the United States Army Medical Corps, died at the Walter Reed Hospital, Washington, D. C. on August fourth after an illness lasting several months. He thus was the first Rhode Island Physician to die in active service with the armed forces in this war.

Born in Providence, he graduated from LaSalle Academy, Providence College and from Jefferson Medical College, Philadelphia in 1935, receiving his license to practice medicine the following year.

He served interneships at the Charles V. Chapin Hospital, Rhode Island Hospital, Providence Lying-In Hospital and was assistant resident physician at Wallum Lake Sanatorium.

Becoming much interested in army matters he served in the Medical Corps, R. I. N. G. and the Medical Reserve Corps and was called to active duty on March 7, 1941, being stationed at Camp Blanding, Florida with the 103rd Field Artillery, 43rd Division with the rank of Captain.

Tommy Martin had a delightful personality, was a fine fellow to work with, an excellent house officer and an enthusiastic, capable military man. All our sympathies go out to his parents, wife and young child.

HOW A TUMOR CLINIC SHOULD FUNCTION

JOHN F. KENNEY, M.D., *Director*
THE MEMORIAL HOSPITAL, PAWTUCKET, R. I.

(1) *Reason for a tumor clinic in a small hospital:* There is just as much need of a tumor clinic in a small hospital as in a large one, providing the small hospital can meet the requirements of the College of Surgeons and be placed in a classification depending on the ability to handle tumor clinic cases. The American College of Surgeons recognizes three types of such organized tumor clinics:

a. Cancer clinics offering full diagnostic and therapeutic facilities.
b. Diagnostic cancer clinics.
c. Hospital departments conducting acceptable cancer clinics.

Small hospitals may form cancer clinics either individually or by groups of hospitals. We are particularly favorably situated in Rhode Island in that we are a small state. We have an efficient health department that will carry out diagnostic procedures for any group of men or hospitals.

As evidence of the need for a tumor clinic in this locality might I cite the fact that in this short time we have had 420 cases admitted to our tumor clinic or an average of about six new cases per tumor clinic day. We average 35 to 50 old cases on a clinic day.

(2) *Personnel:* It is important to have some one man who is interested in this type of work as a director of the department, and he should surround himself with key men such as the radiologist, radium therapist, surgeon and medical man as a nucleus for his department. It is important that the chiefs of services be made members either of the consulting or active staff of the tumor clinic. The younger men should be encouraged to come in to take histories, blood work, etc. and by observing eventually take the places of some of the older men in the clinic.

(3) *Handling of Patients:* Many of the patients are referred by their family physician for diagnosis and these physicians should receive promptly a verbal or written report as to the findings of the tumor clinic group. The patients themselves must be handled with extreme diplomacy. Care should be taken never to discontinue or dispense with a clinic day thus disappointing a group of patients. They should receive a thorough explanation after their case has been discussed by the tumor clinic group as to just what procedure should be taken. It does not necessarily mean that they should be told they have malignancy but in order to bring home a point to have them follow efficient treatment, they should be told. It should be the aim of the tumor clinic not to have these patients waiting too long. Our average tumor clinic does not last over three hours from the start to finish and as I said before, we handle up to 50 cases during that time including our average of six new cases.

Patients should be handled gently. The average case may be seen by the entire group. Cases that require vaginal or breast examinations should be handled by one, two or three doctors appointed by the director and the findings reported back in detail to the group for discussion.

(4) *Photography:* A department of photography is essential to a tumor clinic group and to date we have some very good photographs of our patients at the start, during progress and at the end of treatment.

(5) *Follow-up:* Follow-up is very important. It has been our system to send a letter and if there is no response a telephone call and finally a visit by our social worker. It is important for the success of the tumor clinic to have an enthusiastic social worker in attendance to familiarize herself with the patients, consult with the patient at the end of tumor clinic and make such financial arrangements for admission and find ways and means of having these patients admitted to the hospital that may be necessary. I might say here that the same applies to the nursing staff. In order to have nurses trained in this type of work, any new nurses being added should overlap and not start in fresh as they, too, must become familiar with the type of patients.

(6) *Finally, records:* In order to successfully formulate plans for adequate treatment and to guide the principles of the treatment in a tumor clinic, accurate records must be kept. It is important to have accurate follow-up notes, and as I already mentioned, attach photographs to the record so that at the end of five years, proper statistics may be had in order that a type of case or cases may be reported and the results clearly outlined with the formation of a policy to continue the same treatment or to change in the future. An efficient tumor clinic secretary will successfully carry this

out. In fact, an efficient secretary is essential to the success of a tumor clinic for she thoroughly familiarizes herself with the cases and will know intimately each patient, the disposition to the various departments such as radium, x-ray or house admission, all making for the success and the carrying out of the formulated opinion of the group.

I might add that it would be well, as we are doing in our hospital, to have a tumor clinic each day. When a patient is referred to the hospital, the record is immediately taken and the patient is examined by several of the key members of the tumor clinic department and if necessary a biopsy is taken. It is our tumor clinic rule to biopsy each case where practical.

As you can see from this brief summary that I have tried to make of the above points, I could by no means cover in detail what should happen in a tumor clinic but two points are to be stressed: (1) The education of the patient to attend a tumor clinic and report the case early and (2) to make your tumor clinic interesting enough to have a large group of non-members attend, thus, both educating the patient and the doctor in cancer work.

THE INDICATIONS FOR ROENTGEN THERAPY

DR. E. W. BENJAMIN, *Radiologist*

The historical backgrounds of roentgen therapy and radium therapy are so closely related in time, as to be practically of the same age. In November, 1895, Wilhelm Conrad Roentgen discovered the x-ray at the University of Wurzburg. Less than a year later, Becquerel, following Poincare's suggestions, announced the fact that uranium salts were radio-active, emitting rays, which, like the x-ray, were capable of penetrating material bodies.

Madame Curie, in 1898, found that thorium was radioactive and introduced the use of the electroscope, a method that became the basis for a new type of analysis of radioactive substances. Within a very short time, Madame Curie isolated a radioactive substance which she named polonium in honor of her country, and continuing her researches with her husband, Pierre Curie, they discovered in December, 1898, a new, more active element that they named radium. Thus in a period of only four years were discovered all of the basic elements and factors which we use today in the form of radioactive radiation.

The fact that the roentgen ray had biologic effects on the human body was first discovered by a young Viennese physician, Freund, who noted epilation in a patient who had undergone an x-ray examination of the skull. X-ray burns of the pioneer roentgenologists were not long in providing tragic evidence of the effects of x-ray radiation.

Following this, one of the earliest therapeutic applications of the x-ray was for treatment of a hairy mole.

From the very beginnings of the science of Roentgen irradiation, attempts were made to establish a dosage, and it is quite natural that the first attempt was from the biological standpoint, namely the erythema dose, which was defined as that quantity of radiation, which when delivered at one sitting will, in at least ninety-five percent of the cases, produce a reddening of the skin within one week after radiation, followed by subsequent bronzing without any permanent injury to the skin.

Following this, numerous photometric measurements were introduced, the most widely used of which, was the Kienboeck pastille, which changed color according to the amount of x-ray radiation it received. The final evolution of the measurement of x-ray dosage belongs to the physicists and culminated in the establishment of the international or "r" unit, known as the "roentgen". This unit is based upon the ionization produced by the x-ray beam in a given volume of air under certain conditions and is defined as "that quantity of x-radiation which, when the secondary electrons are fully utilized and the wall effect of the chamber is avoided, produces in one cc. of atmospheric air at O.C. and 76 cm., mercury pressure, such a degree of conductivity that one electrostatic unit of charge is measured at saturation current." This definition was subsequently modified in 1937, but did not alter this value.

Roentgen dosage is based on two factors in its clinical application, namely the dose as measured in air without back-scattering, and secondly with back-scattering. In this latter connection, it might be said in passing, that back-scattering may add as much as forty percent to the dosage as measured in air alone. Another highly important factor is the depth dose, namely that beneath the surface of the skin. Without burdening you any further with depth dosage, suffice it to say that in x-ray treatment of 200 K.V. with a filtration of ½ mm. copper

plus 1 mm. aluminum at a 50 cm. target-film distance, the depth dose 10 cm. below the skin surface is only about 35 to 50% of the dose at the skin surface.

I am not qualified to go into the detailed physics of the x-ray, but in general, it can be stated that the x-ray is, as far as we know, a form of electromagnetic radiation, of varying wave length, situated between short radio waves and the gamma and cosmic rays.

The subject of the indications for the use of x-ray therapy is such a broad topic that it is difficult to even attempt to mention the entire range of this field. When considering the effect of x-ray radiation on human tissue, it may be stated in general that its action is primarily destructive. Furthermore, it must be kept in mind that in the field of infection, the effect of roentgen irradiation is necessarily different. Infections are treated with very small dosage and at low voltage and the destructive effect certainly does not constitute the same factor as in the treatment of malignant disease.

Roentgen irradiation finds its most effective field in skin and mucous membrane neoplasms, principally the epitheliomas and well over ninety percent of skin carcinomas can be more or less permanently destroyed by means of roentgen irradiation.

The estimation of dosage required in a particular case is one that naturally calls for considerable judgment and experience. It is readily apparent that the roentgen ray is capable of destroying any tumor mass within the body but unfortunately such a dose would in many cases also destroy the patient. In other words, great consideration must be given to the normal tissues, some of which are always included in the field of irradiation.

All x-ray therapy is based on the premise that normal tissues can withstand a greater dose of roentgen irradiation than the tumor. Thus, when an epithelioma is destroyed by means of roentgen irradiation, the adjacent normal tissues are likewise subjected to a very destructive dose, but it is the ability of the normal tissue to recover from this insult that leads to healing, whereas the tumor tissue succumbs. Indeed, Ewing has stated that the tumor burns in the flame of the normal tissue bed.

Roentgen irradiation has very wide clinical application and its effect on neoplasms depends upon the character of the tumor, its location, and the presence or absence of metastasis. Since the reaction of the human tissues to roentgen irradiation varies throughout the body, likewise the tumors originating in these tissues show a varying sensitivity to the roentgen ray. This difference in radiosensitivity is expressed in the following table of Desjardins of the Mayo Clinic, beginning with the most sensitive and ending with the least sensitive tissues:—

1. Primitive Blood Cells.

These are the immature cells of the hematopoietic system such as are seen frequently in cases of leukemia. In this disease, the response to roentgen irradiation is at times almost startling but unfortunately not permanent. An example of the remarkable effect of roentgen irradiation in this field is indicated by a reduction of the white cell count in a case of leukemia, from 400,000 to about 75,000 after one small dose of roentgen irradiation administered over the spleen. This remarkable effect is mentioned to indicate the great care which must be used in treating this condition by roentgen irradiation.

2. Germinal Cells of the Ovaries and Testicles.

Here we are dealing with extremely radiosensitive organs, and except where these tissues require direct exposure, they must be carefully shielded from the x-ray beam. Where we are dealing with ovarian or testicular tumors, the response to irradiation is very marked. In this connection, it might be stated that the normal testicle or ovary can be destroyed by roentgen irradiation and indeed this is sometimes called for clinically, notably in cases of prostatic or mammary carcinoma where x-ray castration can be accomplished by direct irradiation over the testicles, or ovaries. I might interpose at this point, my experience in New York in therapeutic abortion by means of roentgen irradiation of the pelvis where indicated clinically. In this series of cases there was a return of menstrual cycle in from six months to two years following the irradiation and some of these patients had subsequently gone through a full-term pregnancy with delivery of a normal child. Much has been written in this connection regarding the possibility of the production of monstrosities in cases where pregnancy occurs some time after roentgen irradiation of the ovaries. No such cases have been recorded, but the painstaking work of Little and others have definitely produced monstrosities in pigs in the later generation of irradiated animals, but only by inbreeding. Kaplan has been following a normal

female child who is at present fifteen years of age, whose mother has received extensive irradiation over the pelvis a few years before becoming pregnant with this child. If and when this child marries it will be interesting to see what her offspring will present from the standpoint of an anatomical anomalies. It will take several generations really to answer this question of the effect irradiation has on the hereditary aspects in the human. That it has an effect on the genes and chromosomes has been demonstrated in pigs by inbreeding. The answer to this question probably will not be forthcoming for another fifty to seventy-five years or more, because the real answer will have to be delayed until, by the long odds of the law of chance, a union is affected between a male and a female both of whose grandmothers or great-grand-mothers have been subjected to an appreciable amount of roentgen irradiation to the ovaries.

3. *Blood Forming Tissues, including Cells of the Red Bone Marrow, Lymphatic System, and Spleen.*

In this group may be included the lymphomas, lymphosarcomas and Hodgkin's disease, all of which are quite radiosensitive although here again, unfortunately, the results are not permanent but, especially in the case of Hodgkin's disease, there is a definite and sometimes prolonged extension of life with great comfort to the patient.

4. *Some Glands of Internal Secretion as the Thymus, Pituitary, Adrenal and Thyroid.*

Of these, it may be particularly noted that the thymomas and basophyllic tumors, (Cushing's Disease) of the pituitary are quite radiosensitive.

5. *Skin.*

Here, as stated previously, we find possibly the greatest and commonest use of roentgen irradiation and I should like to repeat that most epitheliomas, perhaps well over ninety percent can be cured. In this group are included the breast carcinomas, which is a field that could well be a subject of a whole evening's discussion. For our purposes this evening suffice it to say that roentgen irradiation is of definite value when used with or without surgery. Accessory treatment to produce a castration by irradiation over the ovaries in menstruating subjects with mammary cancer has already been mentioned.

6. *Abdominal Viscera, Large Intestines, Pancreas, Kidneys and Uterus.*

In these organs, particularly the uterus, roentgen irradiation is of great use as an adjunctive form of therapy.

7. *Connective Tissues, Muscles, Fascia, Cartilage, Bone Fat and Nerve Tissues.*

The greatest value of roentgen irradiation in this group is in the treatment of bone neoplasms, largely in association with surgery. In particular reference to Ewing's sarcoma of the bone, this type of tumor is markedly radiosensitive and x-ray treatment should always be used, either with or without surgery. In regard to nerve structures I may mention irradiation of the cervical sympathetics in angina pectoris.

This quick survey of the indications for roentgen irradiation is necessarily incomplete. Enough has been stated to indicate its wide field of application. It should be stressed that roentgen irradiation covers a very great field in conjunction with surgery or radium. For example, I believe that with very few exceptions, that all cases of carcinoma of the cervix or uterus, treatment by radium or surgery should have supplementary roentgen irradiation.

In this necessarily limited survey, I have only attempted to touch the highlights and I should like to close my remarks by again stressing the important role of cooperation between the radiologist and the various services, the clinician, the surgeon, the radium therapist and the pathologist, in all cases where roentgen irradiation is indicated.

May I express my appreciation to the Rhode Island Society of Pathologist for the pleasure in taking part in your meeting.

THE INDICATIONS FOR RADIUM THERAPY

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It is the tendency of the present and no doubt of the future, to place the burden of responsibility of Radium Therapy upon the Surgeon. Throughout the Country, I feel that the Roentgen Therapist has readily relinquished this work to the Surgeon except perhaps in the large centers, where he would be called upon for a considerable amount of Radium therapy. It has been my observation that even in large centers to-day, with the exception of teleradium therapy, Surgeons, in their own anatomical fields, prefer to administer their own therapy. The

Radiologist with the extremely large field of Roentgen diagnosis and therapy, feels that he has a sufficient ground to cover without the risk of added exposure to Gamma rays; also, because this is a field where many times he is compelled to turn to a Surgeon because of surgical procedures involved in the administration of Radium; and lastly, perhaps because in our smaller communities, he is not called upon often enough to warrant owning the material or required to keep the data of dosage, etc. in his mind. No doubt, if he owns Radium, he would feel in a way, he was competing with his very expensive therapy apparatus and causing a heavy additional outlay of money.

It is not the purpose of this talk to cover completely any particular phase of the indications for the use of Radium, but rather I will discuss a few areas we see more commonly in our Tumor Clinics and in particular some of those lesions in which the use of Radium is debatable, since other measures may be indicated and perhaps are just as effective.

I feel exceptionally fortunate in having Dr. Benjamin, our Roentgenologist, as head of an allied department. With a department of Roentgen therapy and one of Radium therapy, the problem might arise at times, of some overlapping in the question of treatment. In the three years since the beginning of our Tumor Clinic, I do not remember an instance in which we were not in accord as to the proper modality to use and I am sure our mutual understanding will insure future years against friction. To progress, it is necessary to deter from the beaten track and when such instances occur, we have, as one might say, been seeing eye to eye on the issue.

In the minds of many, since the Physicists tell us that the X-ray and the Gamma ray of Radium are identical in their physical character and physiological effects, there is a competitive field upon which Radium therapy and Roentgen therapy meet. Such is not the case. It is our understanding that there are very definite indications for both and perhaps very little place for overlapping if properly applied. Occasionally a Tumor Clinic member or Staff Member who has not sufficient knowledge of Radium or X-ray may cause confusion to occur but as a rule an explanation will straighten out difficulties in this circumstance.

In a talk on the indications for Radium therapy, perhaps a few words on the nature of Radium would be helpful in understanding our reasons and use. To me, the physical nature of Radium is a fascinating study. I regret that we do not have facilities to work with the Physicists who are constantly experimenting with it. It is unfortunate that the physics of Radium are not stressed in medical education.

As most of us know, Radium is an element of high atomic weight and therefore is a complex atom. Only atoms of high atomic weights have this property of radioactivity due to a spontaneous disintegration of the nucleus of the atom. When this spontaneous disintegration occurs, there starts the process of forming new elements until the final event occurs, in which only lead is left. Here the transmutation process of the Alchemists is realized, but in reverse. They would start with lead in an attempt to make a more valuable metal.

In this disintegration phenomena, we recognize three different rays, so called: The Alpha, Beta and Gamma. The Alpha and Beta make up about 96% of the emanations, whereas, the Gamma constitutes only about 4%. In medicine, with the exception of the Dermatologist, we do not use the Alpha and Beta rays but eliminate them or filter them. Since the Alpha rays cannot penetrate a sheet of paper, they are easily eliminated. The Beta rays are eliminated by ½ mm. of platinum. Thus our containers, either capsules or needles, prevent the undesirable Alpha and Beta rays and we have only the Gamma coming through the walls of the containers. It is of interest to note that the Alpha rays are not rays at all, but helium nuclui traveling with high velocities. The same is true of Beta rays; there are nothing but electrons flying through space. The Gamma rays are true rays traveling with the speed of light and capable of piercing several inches of lead.

Many ask the question, — if the Radium atom is constantly exploding, why is the quantity not used up quickly? But Radium decays at a very definite rate. In other words, a given number of atoms will disintegrate within a given time. Thus, we know that a quantity of Radium will only be ½ used up in 1690 years, and ½ of the remaining portion will be used in another 1690 years, so that a supply will not be totally inert for approximately 20,000 years. This misunderstanding is caused no doubt by the gas Radon, which has the same properties as its parent, Radium. Radon disintegrates much more rapidly. This gas is formed when Radium salts are placed in solution. After recovery from the solution, it is pumped into small gold

capulary tubes. A supply of Radon will be entirely used up in 30 days. Therefore, it is used frequently in locations where it is not easily removed and knowing that it is not active over 30 days, we know that it will not cause harmful effects if the seeds are not removed. Radium, on the other hand, if it were left in a tissue would continue to radiate as long as it was in place. Radon also by merit of its small size may be placed into cavities with instruments, thereby relieving us of the necessity of open operation. In the mouth where large needles and applicators are not easily used, it is perhaps the method of choice. Perhaps the most frequent user of Radon seeds is the Urologist, who may place them with a cystoscope or may close the bladder after implantation without being concerned with removal of the seeds.

Radium may be used in several ways, namely: Into the tissues and referred to as interstitial radiation or contact radiation — in this we mean the Radium is in direct contact with the lesion or 1 to 2 cm. above it. The last type is tele-radium therapy, —in this method large quantities of radium, 4 to 6 gms. in a pack are used at distances of 10 cm. or more from the lesion and in a manner similar to high voltage X-ray machines. This latter I will not discuss because only in large cancer Clinics is this to be had. This modality competes more with high voltage therapy and is used for much the same lesions. As to the relative benefits of high voltage or Radium packs, I would prefer to leave that discussion to the Roentgenologist.

When Radium is applied by contact, the rays when penetrating the tissues are stopped by those tissues. Consequently, in radiating a lesion, we must radiate not only the surface but must consider the depth of the tumor. In order to radiate a deep tumor from the surface, the Radium applicator must be raised above the surface to get enough long penetrating waves deep into the tissues. This reduces the effectiveness of the radium and requires a longer period of application in direct proportion to the distance from the lesion. Therefore, generally speaking, for this type of work, we would, of course, use high voltage X-ray, since the same effect is had in shorter periods of treatment with less danger to the Therapist and Attendants because of the better protection there is from X-ray machines than Radium applicators.

Considering accessible tumors, such as Carcinoma of the cervix, where Radium may be easily placed into the tissues with needles or in contact, we find that radium treatment has become the method of choice, either with or without X-ray therapy.

In considering this latter condition, a paper would be amiss if mention were not made of work of Doctor Pitts and Waterman, in their experience of over 20 years with interstitial radium therapy for carcinoma of the cervix. It is an outstanding work built on the skill, knowledge and patience of these two men. I would also like to comment on the sincerity and accuracy of their articles. In this day, we are disappointed many times in the articles on radiation. The methods and dosages, as given, are either based on a desire to confuse the reader or perhaps discourage those who lack a proper knowledge of the subject to treat cases. In the papers by Drs. Pitts and Waterman, one may easily follow their work and apply the facts to ones own cases, so concise is the information and without attempt to confuse the readers.

In the interstitial treatment of carcinoma of the cervix, there are many pros and cons as to the combined use with X-ray. No doubt, hard and fast rules cannot be made and perhaps a middle ground is a better route, deciding the merits of each case as to the extent of the disease and the microscopic grading. In the so-called French technique in which applicators containing radium are placed around the cervix and into the cervical canal and uterine cavity, there is little question that pre-operative and post-operative X-ray radiation is necessary. For in this instance again many centimeters of tissue have to be penetrated in order for deeper structures to be reached and to deliver a dose sufficient to be lethal to the cancer cells. Thus, an extremely long period of treatment would be necessary and a dose would be delivered to nearer tissues from which they could probably not recover. In the interstitial method, the dose is delivered from the center of the lesion for all practical considerations.

In lesions of the skin, which constitute a great percentage of admissions to Tumor Clinics, many different opinions exist as to the proper method of treatment. Complete wide excision will probably effect as great a percentage of cure as any other method. However, since many of these lesions are on the face, the cosmetic standpoint has to be con-

sidered. Even with skin grafting, marked scars occur which are many times objectionable. The greater number of these lesions are successfully treated by local excision biopsy followed by X-ray therapy. However smaller lesions not over 2 cm. may be successfully treated by Radium in contact and consequently there is less wear and tear on the high voltage X-ray equipment. However, Radium treatment means a considerable exposure of the fingers of the Therapist to treat these lesions, particularly if the Therapist has any great amount of Radium therapy. This latter situation is eased to a certain extent if more than one Therapist or other people are assigned to the work and may alternate, therefore reducing the risk. In the smaller lesions where excision biopsy is performed near to the lesion and is followed by close approximation of the skin to minimize scar, there arises the question as to whether the surrounding tissues should not be radiated to prevent recurrences. I feel that if the excison is made close to the lesion, radiation of the surrounding tissues for more than 1 cm. is advisable by either Radium or X-ray therapy. The fact that groups of cancer cells may exist beyond the 1 cm. margin has been proven by us. Starting a couple of years ago, in cases where surgery was to follow treatment of lesion, biopsies were taken from the neighboring tissues over 1 cm. from the lesion and in what appeared to be normal skin. In many of these biopsies, cancer cell groups were found.

In the recurrent type of skin lesion which has been previously radiated and is made up of dense fibrous tissue with malignant cells imbedded and which is frequently radio-resistant, our treatment of choice is wide excision by actual cautery to be followed by skin grafting, if indicated.

Another method of treating these skin lesions may be by low voltage X-rays or Contact X-ray therapy. In many large Clinics, small lesions are conveniently treated by Contact therapy, which has definite advantages and disadvantages. This field is, of course, Dr. Benjamin's and perhaps he will give his ideas on the subject.

In the intra-oral lesions, the treatment of which brings so many unsatisfactory results, some lesions are better treated by Radon seeds or Radium needles, while others are in areas, accessible for the various X-ray applicators. Some of these lesions may be treated by Radium in moulages and this latter method would no doubt be ideal except that there is a time element required to make the moulage and since these lesions are rapidly growing, the shape many times has changed by the time the moulage is made or worse still, the disease may extend to a degree of incurability in the meantime. To make a moulage correctly requires the effort of a Dentist. At our Clinic, Dr. Fortier has built some very fine ones, one of which I will exhibit to you. However, it is a complicated process requiring much time which is precious to the patient so afflicted. These moulages must be made in the same manner as a denture plate and the ones made otherwise are not satisfactory.

The last lesions which I will discuss and which come up for treatment frequently in our Tumor Clinics are Hemangiomas. Many of these lesions are easily excised or treated by sclerosing solutions. However, on the face where cosmetic considerations are of utmost importance, they are easily handled and the dosages required are so small that concern over neighboring structures are needless. Also we are able to arrest their growth and then discolorize to the extent we wish for best cosmetic results.

In this brief discussion of the issues regarding the proper method of treatment, I feel that Tumor Clinics have had a marked effect on the choice of therapy. There is no doubt a marked improvement in the handling of cases from the standpoint of X-ray and Radium therapy. This is because most of the cases are treated after group consideration, comprising pathologists, Internists, Surgeons, Roentgen and Radium Therapists. Each case is discussed openly, that we may not be biased or become surgically minded, X-ray minded or Radium minded, but allow the case to have the most suitable type of treatment, depending upon the circumstances. Again, there probably is an advantage in the Surgeon being given the responsibility of Radium therapy and since he may use either method, he would more often apply the best type, depending upon his judgment. In the past, a Surgeon would apply only surgery to all lesions and the Radium Therapist would apply Radium to all lesions, and both having their cases suffer because of being unfamiliar with the other man's tools.

We have a great responsibility placed upon us by our predecessors. We are able to start where they left off; consequently, much more will be expected of us in terms of results.

FIFTH ANNUAL EXHIBITION AMERICAN PHYSICIANS' ART ASSOCIATION

New Officers

President ..... SAMUEL GELLERT, M.D.
Vice-President ..... MAX THOREK, M.D.
Sec'y-Treasurer ..... F. H. REDEWILL, M.D.

The fifth annual exhibition of the American Physicians' Art Association was held June 8-12, 1942, at Atlantic City, N. J., in Convention Hall, under the same roof with the American Medical Association.

This exhibition was enthusiastically acclaimed the most attractive one of the entire convention, as evidenced by the fact that the 40′ x 60′ room was filled with visitors at all times. There were 350 original art works, a large number considering war time. Seventy-three prizes were awarded, so that every contestant felt that he had a chance to win an award, especially since the prizes were divided into four classes, according to the length of time the artist had been working: Class A, over 8 years; Class B, 3 to 8 years; Class C, 8 months to 3 years; Class D, under 8 months.

Under the new rules, no artist may receive more than one award in one year. No private or commercial prizes are permitted, all prizes being the Association's.

One of the interesting developments of the exhibition was that physicians returned again and again, bringing along friends and families. In many instances, doctors' wives brought the doctors. The estimated attendance was 15,000, and it is doubtful that a single visitor to the Convention missed viewing the art exhibit.

The annual banquet was attended by 130 members and friends of the Association, this number being many times larger than at previous meetings. A feature of the banquet was an illustrated talk by Mr. Fred Weber on "Newer Technic of Painting."

Many former members of the American Physicians' Art Association rejoined, and over 200 new members were enrolled. It is not obligatory for a physician to be an artist; he may join either in hope, or simply because he appreciates art and wishes to encourage the physicians' art movement.

Mead Johnson & Company's ambition to make the American Physicians' Art Association self-sustaining will probably be attained when the membership reaches 1,000. The outstanding success of the 1942 exhibition has assured a firm foundation and augers well for the future.

BOOK REVIEWS

BLOOD GROUPING TECHNIC by F. Scheff and Wm. C. Boyd, Interscience Publishers, Inc., New York City.

The subtitle of this book, "A Manual for Clinicians, Serologists, Anthropoligists and Students of Legal and Military Medicine" indicates its usefulness. The orderly arrangement of the theory, methods and uses of Blood Grouping Technic makes it a good text-book for the beginner as well as a handy reference book for those more accustomed to laboratory procedures.

The Clinician can find the reasons for rules regarding the collection of specimens and for confusing delays and errors in laboratory reports. The pitfalls of technic are pointed out and some explanations are given for reactions following transfusion.

For the Serologist, there are complete and emergency methods of performing the tests and full directions for the preparation of reagents and their standardization.

There is a discussion of Blood Banks and the uses of blood substitutes including plasma and serum in their various forms.

Chapters on forensic applications of Blood Grouping and on investigations in Anthropology complete the book, making it a valuable addition to the library of anyone concerned with the subject.

ESTHER E. BRINTZENHOFF

WAR GASES—THEIR IDENTIFICATION AND DECONTAMINATION by Morris B. Jacobs, Ph.D. Published by: Interscience Publishers, Inc., New York, N. Y., 1942.

This book of 162 pages on Chemical Warfare Gases is written primarily to give information on poison gases which may be useful to the gas identification officer, the war gas chemist, the decontamination officer, and the health officer. Several chapters are also useful to the air raid warden. Medical aspects of chemical warfare gases are not included, and therefore the book is of little reference value to the physician. The chapters on effect of war gases on materials, water, and food; scheme of analysis of the various gases; detection and determination of arsenic; confirmatory tests; and decontamination, are fully descriptive. The book is compact and well written and should serve a useful purpose as a handbook for the civilian chemical warfare gas officers.

KALEI K. GREGORY, M.D.
Deputy Medical Gas Officer
State Council of Defense